ACT20C-AI-AO-MTCP

Manual

Weidmüller

Previous edits

Version	Date	Modification
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1. General

1.1 CE-Approvals

The products comply with the directives of the European Union and are therefore entitled to bear the CE marking.

1.2 Guarantee statement

1.2.1 36 months guarantee

The guarantee for the ACT20X signal converter from Weidmüller is 36 months and varies according to the guarantee conditions of the general sales conditions from the Weidmüller company that sold you the products.

Weidmüller guarantees that products of the kind described above, which were defective at the time of risk transfer, will be repaired free of charge or Weidmüller will make an equivalent product available free of charge.

The guarantee applies to Weidmüller products.

If no explicit written commitments for the system or function suitability are made in this manual, no guarantee is given for a specific functionality of specific applications or in specific systems. If not mandatory liable under the applicable law, damages and compensation of expenses regardless of the legal grounds are excluded, in particular for the breach of duties arising from contractual obligations and tort.

In addition, applicable are the general conditions of sale and the expressly granted liability commitments of the Weidmüller company that sold you the products.

2. Safety Instructions

2.1 Intended use

The products are intended for use only for those applications that are described in the manual.

Any other use is not permitted and can lead to accidents and defects.

The use of non-approved applications directly eliminates all guarantee and warranty claims of the operator against the manufacturer.

The responsibility for the safety of a system containing this device lies with the operator of the system, who should also ensure the safety during assembly and operation.

2.2 Qualified personnel

This manual is intended for trained and qualified technical personnel, who are familiar with the applicable standards and regulations for the respective applications.

2.3 Accuracy of the technical documentation

Despite careful preparation of this manual, we assume no guarantee for the accuracy or completeness of the data, illustrations and drawings or liability for their content, unless liability is mandatory by law.

Weidmüller's general terms and conditions apply in their current form. Subject to change.

2.4 Liability

Failure to follow the instructions in this manual eliminates any claims of the customer against Weidmüller that would otherwise apply in the context of the contract.

2.5 Definitions

- Dangerous voltages according to the definition lie in the range:
  75…1500 V DC and 50…1000 V AC.
- Technicians are defined as qualified personnel who are technically and correctly trained to meet all safety regulations for installation, operation and troubleshooting.
- Operators who are familiar with the contents of this manual are defined as persons that can adjust and operate the switches or potentiometers during normal operation.

2.6 Symbols and their meanings

	DANGER Indicates an imminently hazardous situation which may lead to death or se-rious bodily injury.
	WARNING Indicates a potentially hazardous situa-tion, which may lead to death or seri-ous bodily injury.
	CAUTION Indicates a potentially hazardous situa-tion, which may lead to moderate or slight injury.
	NOTICE Indicates a situation which can lead to damage to property.
	The CE-identification indicates that the module meets all the essential require-ments of the directives.
	This symbol is used in conjunction with the signal words DANGER; WARNING or CAUTION in order to identify a haz-ardous situation.

2.7 Electrical safety precautions

	WARNING Dangerous voltage! • Before any installation work, the power supplies to the circuits are to be turned off and their discharge made safe. Observe ESD installation instructions in-cluding EMI safety regulations!

2.8 General instructions

	WARNING Observe the following instructions as well as all other instructions in this manual, in order to avoid risks in the intended use!

- Read and follow all instructions in this manual.
- Learn more about the dangers that may arise from this product.
- Observe the safety regulations and accident prevention regulations.
- Regularly check compliance with all measures for the prevention of accidents.
- Only take the product into operation if it is in good condition, if it is to be used as intended, if it complies with all safety instructions and all the dangers are known and all instructions in this manual have been complied with.
- Make sure that this manual and any other relevant documents are complete, readable and accessible to the employees at all times.
- Refrain from all measures and activities that expose employees or third parties to any hazards.

2.8.1 Reduce residual risks through risk assessment

The energy value of the housing has been measured according to IEC 62262, IK 06 (1J).

The "Eha" (pendulum hammer) test method according to IEC 60068-2-75 was applied.

	WARNING Mount the module only on a mounting rail inside a cabinet and place an end bracket WEW35/1 at the start and the end of a single module or a module group.

3. Introduction

3.1 Product description

3.1.1 Regarding ACT20C-AI-AO-MTCP Signal converters

Weidmüller is presenting a new type of signal converter with the ACT20C. The compact module, with 22.5 mm per channel, has an Ethernet port and re-quires only little space in the control cabinet. The ACT20C converter can be configured directly with the WI-Manager software with ACT20C-DTM or via an Ethernet network. The software is based on the supplier-independent FDT/DTM technology. The ACT20C includes analogue converters which sepa-rate, scale and convert analogue current and voltage signals. The module has a 4-way isolation. The ACT20C always delivers a pure, interference-free signal thanks to its accuracy, temperature stability and high insulation strength. The ACT20C module can be used in the temperature range from -20 °C to +70 °C.

Weidmüller specifically developed the ACT20C sig-nal converter for process automation to continuously redirect readings and equipment information to networked devices. The integral network connection provides a continuous status message during normal operation, if there is a failure, in cases of maintenance and configuration via the network, which enables a fast error representation and identification according to Namur NE107 and in turn contributes to a higher system availability.

With the WI-Manager configuration software based on FDT (Field Device Tool) technology, the ACT20C can be customised on the PC for different process applications. For its ACT20C module Weidmüller provides the Device Type Manager (DTM) for this purpose, which can be implemented in any FDT based frame. DTMs also allow the evaluating of measurement and diagnostic data in addition to a fast and error-free configuration of each device. The DTM can also be used to clearly identify the con-nected device.

The connection system of the ACT20C module allows a simple and coded plug-in. The integral release lever ensures the releasing of the connection without damage during maintenance. The movable transparent front panel is simple to open. It is also easily marked with a device marker.

Properties

- Network-compatible signal converter with Ethernet
- Scalable current or voltage input
- Current or voltage output
- Limit-value monitoring with parameterization options
- Diagnostics on device status, signals and line faults via Modbus
- PC configuration with FDT/DTM software
- Power supply via the CH20M rail bus possible
- Simple, coded plug-in of terminals
- Front panel with device markers

More details on the product properties can be found in chapter 6.1 “Properties of ACT20C-AI-AO-MTCP”

4. Installation

WARNING

Dangerous voltage!

- Before any installation work the power supply of the circuits are to be switched off and any discharge secured

NOTICE

Material damage caused by electrostatic discharge (ESD)!

- The following procedures must be carried out exclusively under conditions where protection against electrostatic discharge is ensured.

4.1 General

This product must be installed only by qualified technically trained personnel who have received comprehensive instruction in measuring and control technology.

VDE 0105 part 1 / DIN EN 50110-1 defines qualified staff as staff experienced in the field of electronics, personnel trained in electronics or such staff whose qualifications meet local standards.

4.1.1 Environmental conditions

This product is intended for indoor use (IP 20) within a control cabinet or in a weather-protected cabinet for outdoor use.

- Avoid influences due to direct sunlight, dust, high temperatures, mechanical vibrations and shock, as well as by rain or high humidity.
- The permissible temperature range of the device must be maintained, if necessary appropriate measures (ventilation, heating) should be taken.
- The product must be installed in a zone with pollu-tion degree 2 or better.
  The design of the product ensures safe operation when it is used below a height of 2000 m above sea level.

4.2 Unpacking

- Use the invoice / delivery note to check that the delivered product conforms with the order.
- Also ensure that the installation instructions have been supplied.
- Take care when removing the packaging.

4.3 Installation

- The use of flexible cables is allowed for the mains supply only if the cables are provided with wire-end ferrules.
- The description of the inputs/outputs and the supply connections can be found on the housing side print.
- The module is equipped with field wiring connectors and must be supplied via a power supply with double/reinforced insulation.
- A mains switch must be provided near to the module and within easy reach.
- The mains switch should be marked with a sign stating that the mains switch switches off the module power supply.
- The year of manufacture can be found in the first digit of the serial number.
- If you have any questions regarding the operation of the module, contact your local Distributor.

4.4 Mounting

This product is intended for installation on a TS 35 DIN rail.

It is clamped on the rail with a spring-tightened mounting bracket and can be removed again by pressing the spring release at the edge of the prod-uct next to the terminal rail.

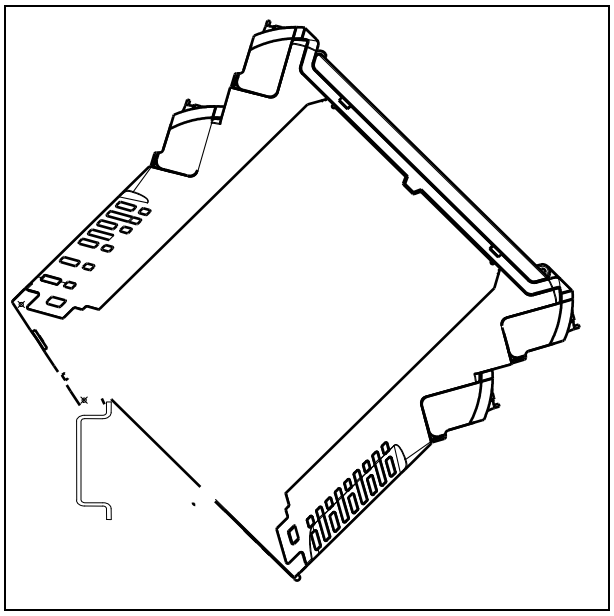

Figure 4-1: Installation, step 1

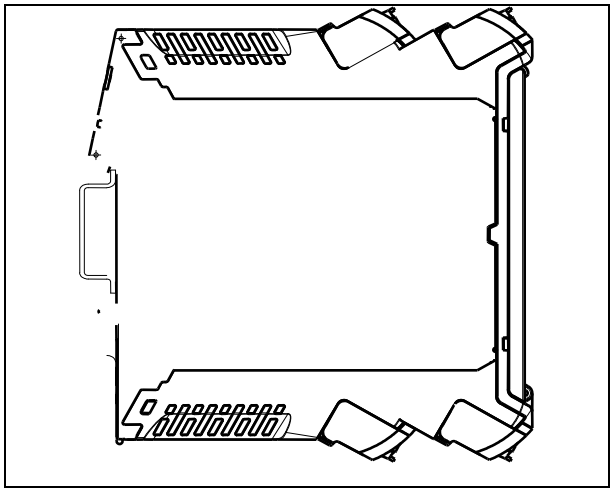

Figure 4-2: Installation, step 2

4.5 Marking

A device marking for the connection ID can be found below the top row of terminals.

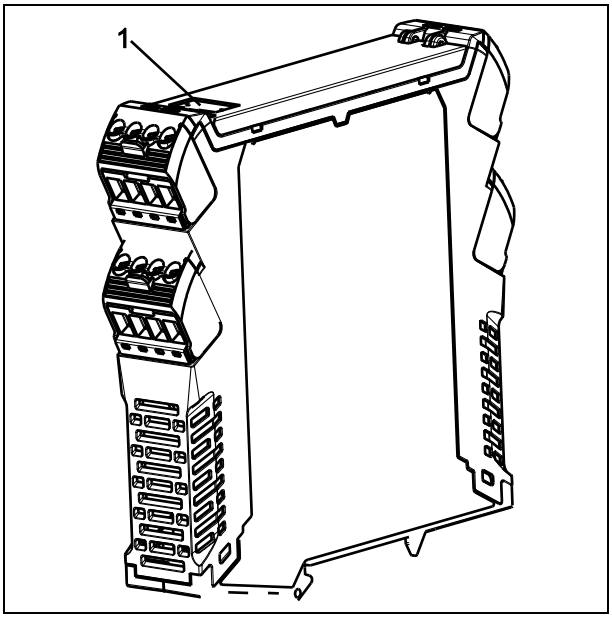

Figure 4-3: Mark
1 Device marking

4.6 Release lever

The terminals are opened with the help of the release lever.

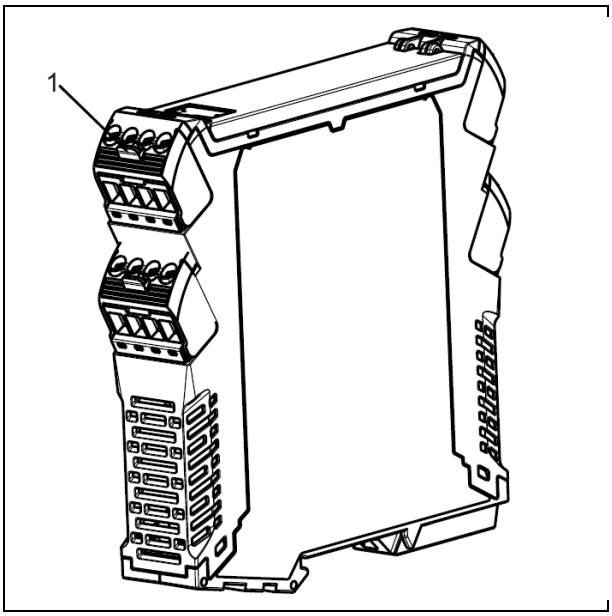

Figure 4-4: Release lever
1 Release lever

4.7 Coding

NOTICE

If the product's plug-in connectors are not coded there is inadequate protection against the risk of faulty connection. All plug-in connectors are uni-formly coded.

- Create a plug-in connector coding plan before connection and code the con-nectors accord-ingly.
- Carry out the coding process for each new module.

The product housing features an automatic cod-ing.

The connector mechanical coding is coded before delivery and can be individually adjusted.

1 To set the plug-in connector adjuster knob, turn it in a clockwise direction with a screw-driver.

Each adjuster has 4 coding positions, which result in 4^2 = 16 possible coding positions.

The plug-in connector is then coded.

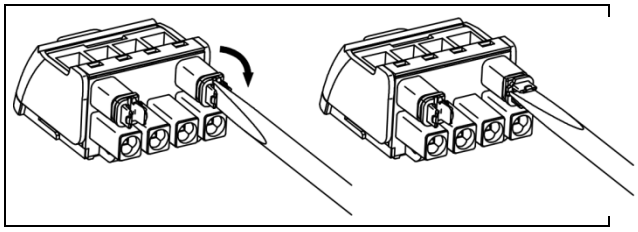

Figure 4-5: Coding the plug-in connector

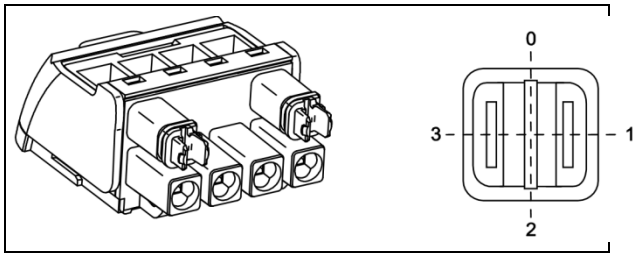

Figure 4-6: Coding position

2 Insert the coded plug-in connector into the con-nector strip.

The coding element is transmitted from the plug-in connector to the connector strip.
The coding element remains in the connector strip housing.

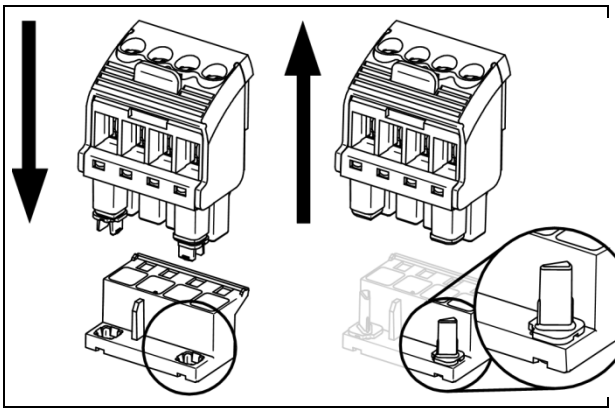

Figure 4-7: Coding element transfer

5. Commissioning and Maintenance

5.1 General

5.1.1 Standard operation

Operator may only adjust and operate modules that are safely installed in cabinets, etc., where there is no risk of personal injury or damage to property. There should be no risk of electric shock and the module must be easily accessible.

5.1.2 Preheating

The product is designed so that it can be put into operation as soon as a current is supplied. Nevertheless, a preheating time of 60 minutes is required, until the module meets the specifications according to the technical data.

5.1.3 Cleaning

1 Switch off the power supply!

2 Clean the module with a cloth dampened with distilled water.

5.1.4 Maintenance

Observe the safety advice and instructions in this manual for any maintenance work on the device or the electrical connections!

5.2 Electrical connections

⚠	**WARNING**
	Note the information in section 2, “Safety Instructions”.

5.2.1 EMC-protection

❗	**NOTICE**
	Input, output and power supply lines must not be laid in areas that are the sources of electromagnetic interference fields! If necessary, additional filtration and safety measures (e.g. shielded cable, surge protection) must be taken!

The sources of interference include relays, contractors, motors and their controls including thyristor control units and the cables that connect corresponding units. ACT20C cables should not be installed together in the same channel with such cables.

The locally valid regulations for the installation of electrical equipment are to be complied with.

5.2.2 Electrical connections

Termi-nals	Function	Plug-in connector	Terminals	Function	Plug-in connector
11	V (-) mA passive (-)	X1: Input (passive/aktive)	51	V (-) mA (-)	X5: Output (aktive)
12	V (+) Test point (-)		52	V (+)	
13	mA aktive (-) mA passive (+) Test point (+)		53	mA (+)	
14	mA aktive (+)		54	Not used	
			61	Functional earthing	X6: Supply
			62	Not used	
			63	GND	
			64	+24 V DC	
			RJ45-plug (above terminal 51)	Modbus TCP, DHCP, FDT/DTM	RJ45: Ethernet Interface
			Jack 2.5 mm (beneath cover)	Serial connection via adapter CBX 200	Interfaces adapter
			81…85	Power supply	DIN Rail Bus CH20M

Table 5-1: Electrical connections

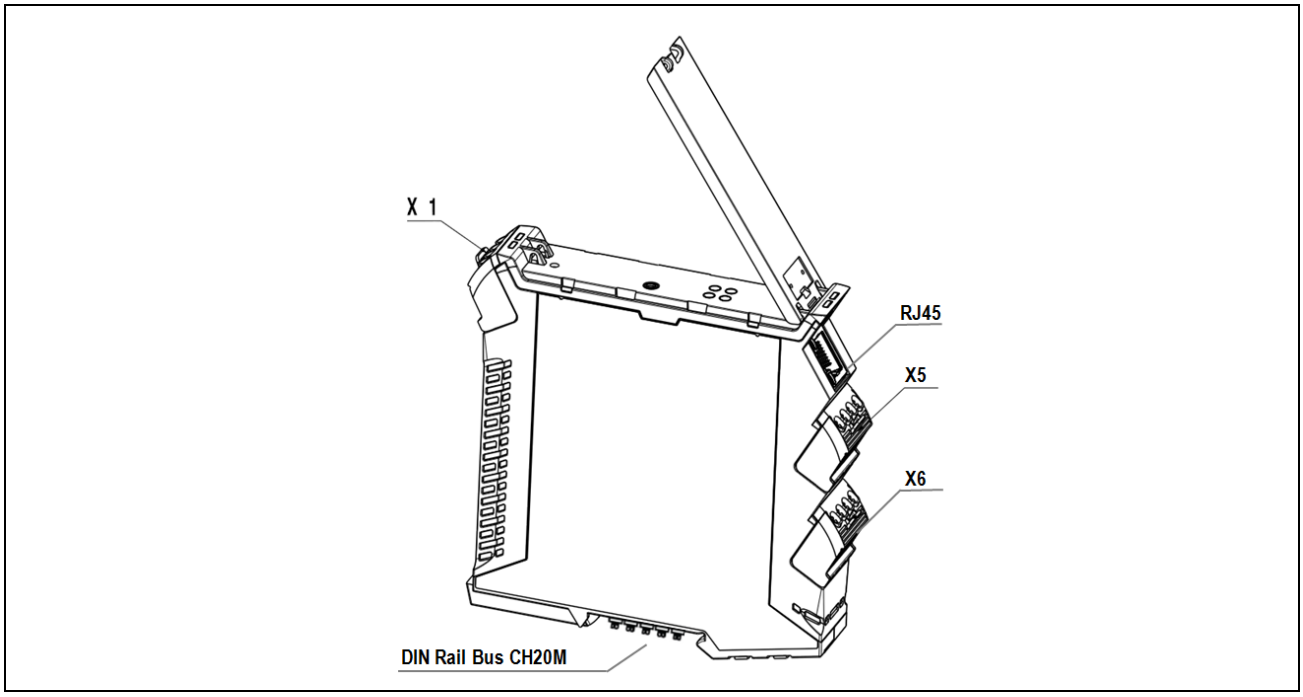

Figure 5-1: Electrical connections ACT20C

The power supply can be via the plug-in connector X6 or the contacts to the Weidmüller DIN Rail Bus CH20M.
For this purpose the Weidmüller supply module ACT20-FEED-IN-PRO-S (Art.-No. 8965500000) with associated Weidmüller rail bus CH20M is required.

5.2.3 Wiring the inputs and outputs

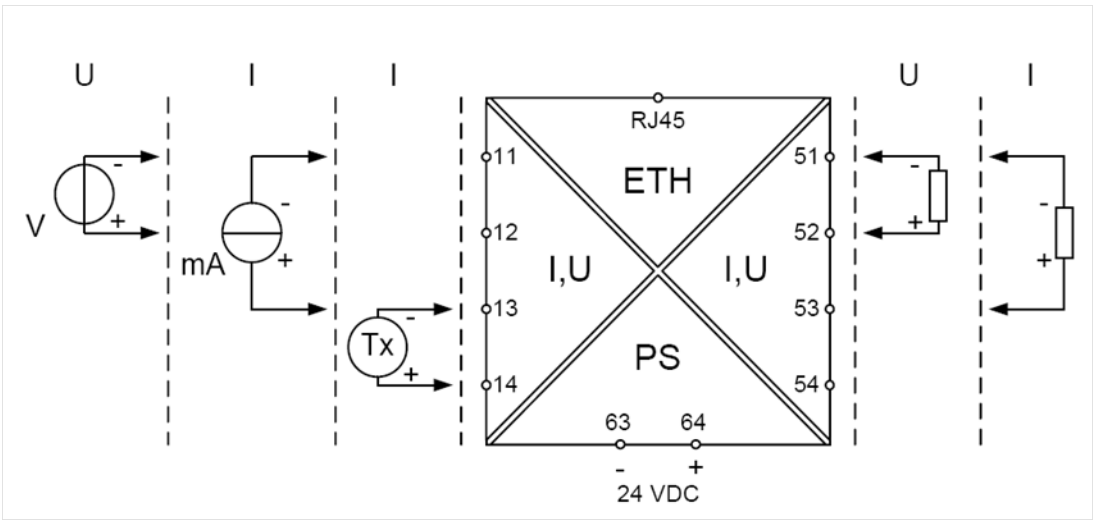

Figure 5-2: Wiring the inputs and outputs

On the input side, one of the following circuits can be selected for the ACT20C:

- an active power source (Pin 11, 13),
- or a transmitter which is fed by the ACT20C (passive sensor, Pin 13, 14)
- or a voltage source (Pin 11, 12)

For the active output, one of the following circuits can be selected:

- as an active power source (Pin 51, 53),
- or as a voltage source (Pin 51, 52)

5.2.4 Connection with other electric circuits

	WARNING
⚠	All ACT20C connections must only be connected with secondary circuits according to EN 61010-2010, which are provided with primary circuits with max. 300 V and over-voltage category II and that have an adequate overcurrent protection device in accordance with EN 61010-1:2010, section 9.6. Use only power supplies that have a double or reinforced insulation for the supply of the ACT20C as well as for the supply of connected Ethernet switches, PLS input cards and externally (!) powered sensors! The voltages at the connections for input, output, Ethernet, and the ACT20C power supply must not exceed the rated voltages in chapter 7.1 “Technical data”! Also observe the information in section 2 “Safety Instructions”.

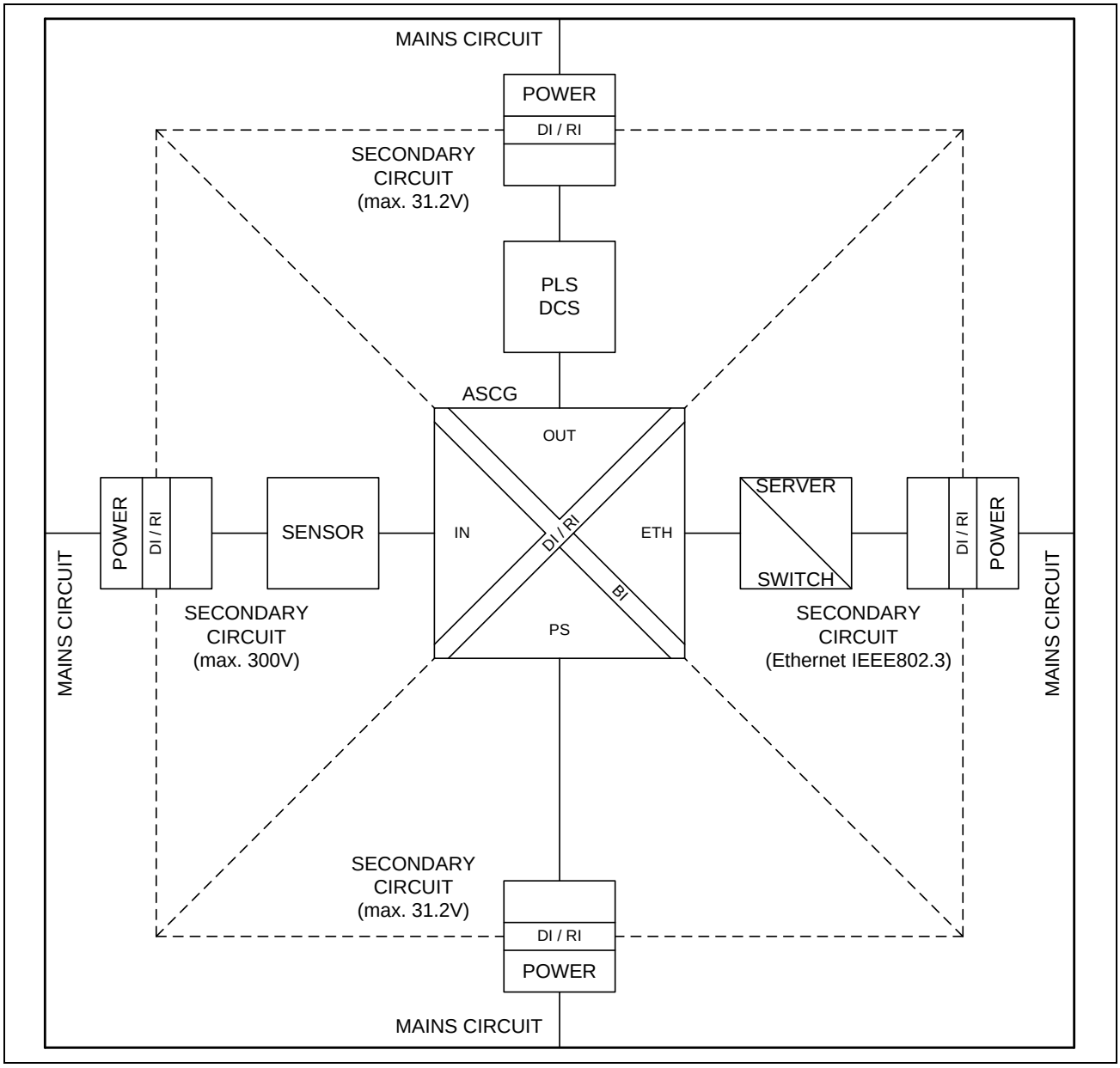

Figure 5-3: Typical connection diagram with other electric circuits

Terms / Abbreviations

DI / RI:	double / reinforced insulation
ASCG:	here ACT20C
Supply:	here supply voltage
Secondary circuit:	Electric circuit in accordance with EN 61010-1:2010 where the isolation of the network circuits is achieved with a transformer, its primary and secondary windings are separated by reinforced insulation, double insulation or by a shield that is connected to the protective earth connection.

6. Configuration

6.1 Properties of ACT20C-AI-AO-MTCP

6.1.1 Description

As a communicative signal converter to isolators, converters and monitors of DC voltage and current signals, the ACT20C allows remote access via Ethernet signals, diagnostics and data for configuration.

6.1.2 Calibration and adjustment

- The device has a factory calibration and does not need to be manually calibrated.

6.1.3 Status/Alarm LEDs

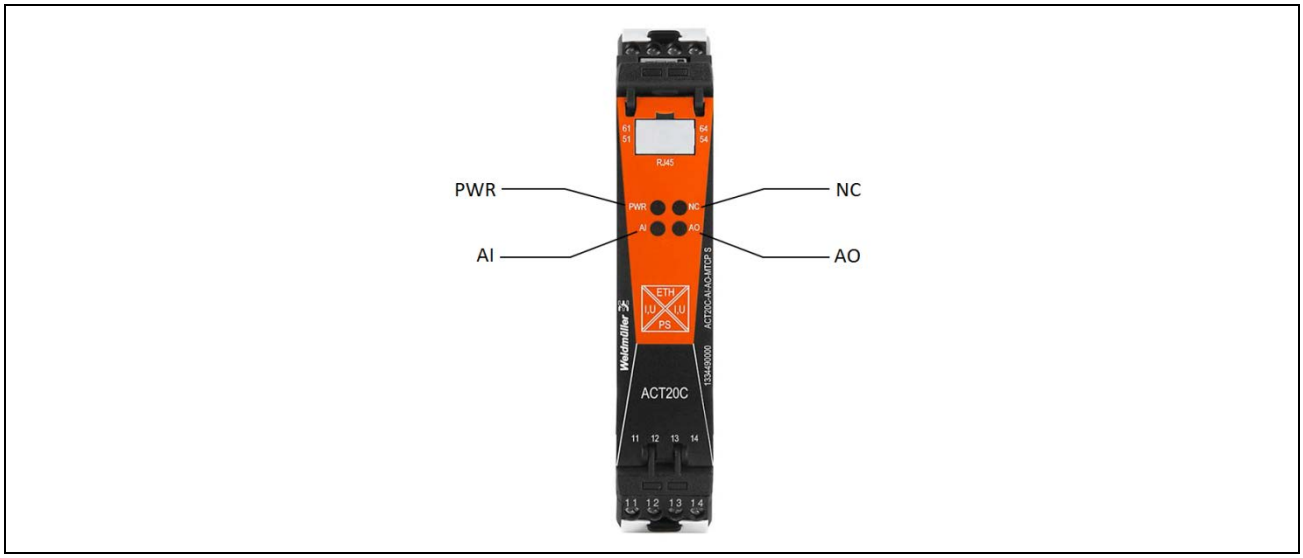

Figure 6-1: Status/Alarm LEDs

LED	Description and status
PWR	**Operating power supply & device status** **1) OFF:** Power supply not "Ok" **2) Green:** Power supply "OK" **3) Red flashing:** Device has detected "maintenance required" or is being operated "outside of specification" **4) Red:** Device has detected "error" or has not completed start-up
NC	Not used
AI	**Analogue input** **1) OFF:** Input signal outside the range limit values **2) Yellow:** Input signal within the range limit values **3) Red:** Device error related to the input signal

LED	Description and status
AO	**Analogue output** **1) OFF:** Output signal outside the range limit values **2) Yellow:** Output signal within the range limit values **3) Red:** Device error related to the output signal

Table 6-1: Status/Alarm LEDs

For each LED, indication specified with a higher position number takes precedence over an indication with a lower number.

Example: the "PWR" LED indication "Green" is displaced with a "Red-flashing" indication in the case of a recognised device error.

6.1.4 Ethernet interface

1. The Ethernet interface has the following default settings:
   a. Default IP-Adresse: 192.168.1.130
   b. Default Subnet-Mask: 255.255.255.0
   c. Default Gateway IP-Address: 0.0.0.0

2. To adjust the IP-address, you can use the DHCP protocol:
   a. Convert the ACT20C by means of DTM to DHCP configuration (see chapter 6.1.6 “More settings”).
   b. Make a note of the ACT20C MAC address. This is located behind the front panel.
   c. Use the MAC address to assign the desired IP-address in your DHCP server ACT20C.
   d. Restart by switching on the supply voltage ACT20C.

6.1.5 Signal processing

ACT20C uses the following factory settings for signal processing.

Input	
Input current	4...20 mA

Output	
Output current	4…20 mA
Underload / overload range	Namur NE43

Signal processing	
Transfer functions	Linear
Limit-value monitoring	Off
Condition Monitoring	Process value: sensor value, output value
Diagnostics	Device status, cable break (input / output), short-circuit (input / output), Overload (sensor / output)

6.1.6 More settings

Additional setting options are described in the manual for the ACT20C DTM software: 1444410000, MAN DTM ACT20C DE and 1444510000, MAN DTM ACT20C EN.

7. Addendum

7.1 Technical data

Input	
Input current	0/4...20 mA
Input voltage	0/2…10 V
Sensor supply	≥ 17 V DC @ 20 mA (-20…+55 °C)

Output	
Output current	0/4…20 mA
Output voltage	0/2…10 V
Load resistance current	≤ 500 Ohm
Load resistance voltage	≥ 10 kOhm
Underload / overload range	Namur NE43

Signal processing	
Transfer functions	Linear, inverse
Limit-value monitoring	Process alarms with adjustable delay and hysteresis
Condition Monitoring	Process value: sensor value, output value
Diagnostics	Device status, cable break (input / output), short-circuit (input / output), Overload (sensor / output)

Allgemeine Daten	
Supply voltage	18…31.2 V DC
Power consumption	≤ 3 W
Deviation[*)]	≤ 0.15 % end value (+0.0 % ≥ 5 °C)
Resolution / accuracy[*)]	Current: 1 µA / 30 µA (+ 1 µA ≥ 5 °C) Voltage: 1 mV / 1 mV (+5 mV ≥ 55 °C)
Temperature coefficient	< 0.01 % / K
Ambient temperature (operational)	-20…+70 °C
Ambient temperature (Storage/Transport)	-20…+85 °C
Operating height	< 2000 m
Max. humidity	< 95 % rel. (no condensation)
Protection degree / Mounting position	IP20 / Arbitrary

Insulation coordination	
Galvanic isolation	4-way, between input / output / power supply / Ethernet
Input to output / power supply / Ethernet Output to input / power supply / Ethernet	Reinforced insulation according to EN 61010-1:2010 Test voltage 1.7 kV $_{a.c.\ r.m.s.}$ (50Hz, 5s) Rated insulation voltage 300 $V_{a.c.\ r.m.s.}$ on secondary electric circuits
Ethernet to power supply Functional earthing to power supply / Ethernet	Basic insulation according to EN 61010-1:2010 Test voltage 0.9 kV $_{a.c.\ r.m.s.}$ (50Hz, 5s) Rated insulation voltage 31.2 V $_{a.c.\ r.m.s.}$ on secondary electric circuits
Functional earthing to input / output	Basic insulation according to EN 61010-1:2010 Test voltage 1.1 kV $_{a.c.\ r.m.s.}$ (50Hz, 5s) Rated insulation voltage 300 V $_{a.c.\ r.m.s.}$ on secondary electric circuits
Pollution severity level	2

Communication	
Ethernet	1 x RJ45, 10/100 MBit/s
Transmission rate	10/100 MBit/s (Automatic detection of transmission rate)
Protocol	Modbus TCP, DHCP, FDT/DTM
Service interface	Jack plug for CBX200 USB
Configuration	FDT/DTM (Ethernet or service interface)
Addressing	DHCP or manual adjustment via FDT/DTM

Conformity	
Approvals	CE
Standards**)	EN 61010-1:2010, EN 61326-1:2006
Recommendations	Namur NE43, NE44, NE107

Mechanical specifications	
Length / width / height	119.2 mm / 22.5 mm / 113.6 mm
Weight	180 g (max.)
Clamping range (rating / min. / max.)	2.5 / 0.5 / 2.5 mm²

Order number	
ACT20C-AI-AO-MTCP	1334490000

*) For 23 °C ambient temperature und 24 V supply voltage.

7.2 Modbus access

Installation and process conditions (primary diagnosis)	Possible cause / Proposed action	Address	Bit-pos	Type	Mode
AI Cable break	Cable break at the analogue input. / Check sensor as well as cabling and cable connections.	10006	0	BIT	R
AI Short-circuit	Short-circuit at the analogue input / Check sensor as well as cabling and cabling connections.	10006	1	BIT	R
AI Sensor supply overloaded	Sensor supply overload. Sensor voltage is too low / Check sensor cabling and cable connections.	10006	2	BIT	R
AI Signal outside the parameterised range	The sensor input signal is outside the parameterised range. / Check the sensor type or adjust the range settings.	10006	3	BIT	R
AI Limit value low limit *)	User-defined process alarm	10006	4	BIT	R
AI Limit value high limit *)	User-defined process alarm	10006	5	BIT	R
AI Limit value low low limit *)	User-defined process alarm	10006	6	BIT	R
AI Limit value high high limit *)	User-defined process alarm	10006	7	BIT	R
AI Limit value window low high *)	User-defined process alarm	10006	8	BIT	R
AO Cable break	Cable break on the analogue output / Check cabling and cable connections	10006	9	BIT	R
AO Short-circuit	Short circuit at the analogue output / Check cabling and cable connections	10006	10	BIT	R
AO Overload	Overload on the analogue output. Output current too low (threshold 2.5 mA (typ.)) / Check the cabling, cable connections and output load	10006	11	BIT	R
Supply voltage too low	Supply voltage too low device is running outside of specification / Check power supply	10008	5	BIT	R
Supply voltage too high	Supply voltage too high. Device is running outside of specificatio / check power supply	10008	6	BIT	R
Ethernet: no connection	No connection to Ethernet (Information only available on the serial interface) /check Ethernet connection	10008	10	BIT	R

Device status					
NE107 error	Device status "Error" due to user-defined assignment of pending primary diagnoses. This condition should be defined so that the functionality of the device is no longer available on the display. / Check the pending primary diagnoses	10008	0	BIT	R
NE107 functional check	Device status "functional check" due to user-defined assignment of pending primary diagnoses. This condition should be defined so that the display of the signal is not the real process value when due to a forced input or output value. / Remove the simulation in order to continue with the normal signal processing.	10008	1	BIT	R
NE107 outside of the specification	Device status "outside of the specification" due to user-defined assignment of pending primary diagnoses. This condition should be defined, so the display of the value of the signal is still ok but the device is operated outside of the specification and the signal may therefore be affected. / Check the pending primary diagnoses	10008	2	BIT	R
NE107 Maintenance request	Device status "maintenance required". Signal value ok, but primary diagnosis available that indicate unexpected conditions. / Check the pending primary diagnoses	10008	3	BIT	R

Process data					
AI Derived value	Analogue input value after calculation of transfer function (e.g. inverted value)	10002	-	S16	R
AI Sensor value	Calibrated sensor value, as measured at the input	10003	-	S16	R
AO Set value	Set value for the analogue output value derived from the signal processing	10004	-	S16	R
AO Initial value	Actual value of the analogue outputs in comparison to the AO set value produces more information in case of short-circuit or cable break or overload	10005	-	S16	R
Operating conditions					
Device operating time	Number of operating hours [h] - low byte	3000	-	U16	R
	High byte	3001	-	U16	R
Current device temperature	Current device temperature x 10 [Deg. Celsius]	3002	-	S16	R
Current device temperature	Maximum device temperature since manufacture	3003	-	S16	R
Identification					
Device name	Name of the device (ASCII)	1100 - 1115	-	U16	R
Hardware version	Manufacturer hardware version	1116 - 1118	-	U16	R
Current software version	Current software version	1125 - 1127	-	U16	R
Order number	Order number for this device type	1158 - 1161	-	U16	R
Serial number	Serial number of the device	1162 - 1166	-	U16	R

Table 7-1: Modbus access

*) Not used for NE107 Device Status
Format: “Little Endian”

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